

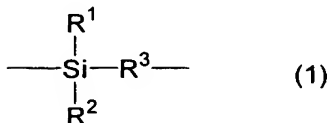
CLAIMS

1. An insulation film comprising an organosilicon polymer with a relative dielectric constant of 4 or less having
5 a dry etching selection ratio to the compound selected from the group consisting of silicon oxide, fluorine-doped silicon oxide, organosilicate glass, carbon-doped silicon oxide, methyl silsesquioxane, hydrogen silsesquioxane, a spin-on-glass, polyorganosiloxane, and an organic polymer selected from the
10 group consisting of polyarylene, polyarylene ether, polyimide, and fluoro resin.

2. The insulation film according to claim 1, wherein the dry etching selection ratio is 1/3 or less.

3. The insulation film according to claim 1, wherein the organosilicon polymer is a polycarbosilane.

4. The insulation film according to claim 1, wherein the
20 organosilicon polymer is at least one polymer selected from the group consisting of polymers having the structural unit of the following formula (1),



wherein R¹ and R² independently represent a hydrogen atom, an

alkyl group having 1-30 carbon atoms that may have a substituent,
an alkenyl group having 1-30 carbon atoms that may have a
substituent, an alkynyl group having 1-30 carbon atoms that may
have a substituent, or an aromatic group that may have a
5 substituent and R^3 represents $-C\equiv C-$, $-CH_2-$ that may have a
substituent linked with at least one $-C\equiv C-$ group, an alkylene
group having 2-30 carbon atoms that may have a substituent
linked with at least one $-C\equiv C-$ group, an alkenylene group having
2-30 carbon atoms that may have a substituent linked with at
10 least one $-C\equiv C-$ group, an alkynylene group having 2-30 carbon
atoms that may have a substituent linked with at least one $-C\equiv C-$
group, or a divalent aromatic group having 2-30 carbon atoms
that may have a substituent linked with at least one $-C\equiv C-$ group.

15 5. A coating solution composition comprising (I) the
organosilicon polymer described in claim 4 and (II) an organic
solvent.

20 6. A method of forming an insulating film comprising
applying the coating solution composition of claim 5 to a
substrate and heating the applied composition.

25 7. A method of forming an insulating film comprising
applying the coating solution composition of claim 5 to a
substrate and heating the applied composition in the presence
of oxygen or peroxide to three-dimensionally crosslink the
composition.

8. An etching stopper comprising the insulation film described in claim 1 formed below an upper layer film comprising a compound selected from the group consisting of silicon oxide, fluorine-doped silicon oxide, organosilicate glass, carbon-doped silicon oxide, methyl silsesquioxane, hydrogen silsesquioxane, spin-on glass, and polyorganosiloxane or an upper layer film comprising an organic polymer selected from the group consisting of polyarylene, polyarylene ether, polyimide, and fluororesin and having an etch rate of 1/3 or less of the plasma dry etching rate of the upper layer film.

9. A hard mask comprising the insulation film described in claim 1 formed on an under layer film comprising a compound selected from the group consisting of silicon oxide, fluorine-doped silicon oxide, organosilicate glass, carbon-doped silicon oxide, methyl silsesquioxane, hydrogen silsesquioxane, spin-on glass, and polyorganosiloxane or an under layer film comprising an organic polymer selected from the group consisting of polyarylene, polyarylene ether, polyimide, and fluororesin and having an etch rate of 1/3 or less of the plasma dry etching rate of the under layer film.

10. A method of dry etching an insulation film characterized by using either the etching stopper of claim 8 or the hard mask of claim 9.

11. A damascene structure processing method
characterized by using either the etching stopper of claim 8
or the hard mask of claim 9.

5 12. A dual damascene structure processing method
characterized by using either the etching stopper of claim 8
or the hard mask of claim 9.